THE OPERATIVE TREATMENT OF TALIPES CALCANEUS, PARALYTICUS.[1]

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IN MAY, 1884, I began operating upon a class of cases generally regarded as intractable. I present my results at this time for the sake of a full discussion. Like most of the operations on deformities, observations made many years after the operation are most desirable, yet I feel justified in bringing up this subject now for discussion. Naturally many points have suggested themselves to me, and every case has been instructive. The deformity under consideration is known as talipes calcaneus. By this we understand a form of club-foot in which the heel is depressed rather than raised,—in which the tendon and muscles on the posterior aspect of the leg are elongated rather than shortened, a deformity which compels the patient to walk on the heel while the greater part of the foot is in mid air. The most common cause of the deformity is polio-myelitis, and, as this lesion is most frequently seen in children, the resulting disability is most naturally found in childhood.

I think I am safe in making this statement: That the prognosis in the average cases of talipes calcaneus is bad; that the muscles and tendons are stretched as time goes on rather than the reverse. The orthopædic surgeon and the neurologist need no further description of this form of club-foot, and I do not think they need any information as to prognosis. All present will agree with me, I am sure, that the efforts at walking tend rather to increase the deformity, than to diminish it. Clinically, therefore, we have at first a relaxed tendon and muscles at the back of the leg, later an elongated cord or tendon, and later still a club-shaped appearance of the heel, with shortening of the plantar muscles, presenting a typical case of calcaneo-cavus of high degree. When I assert that we have very little encouragement to give our patients if time alone is allowed to effect relief, no carping pessimist in therapeutics can reply that "Oh well, time itself effects wonders in the relief of this deformity." It is unnecessary for me to quote authorities on this subject, for the reason that authorities are, as a rule, unanimous.

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[1] Read before the Orthopædic Section of the New York Academy of Medicine, January 17, 1889.

It is pertinent, now, to ask what mechanical treatment accomplishes. While I do not profess to be familiar with every form of apparatus that has been employed for the relief of this variety of talipes, I claim a reasonable familiarity with the principle involved in all forms of apparatus. We aim to depress the foot and raise the heel. We aim to make of the case a talipes-equinus, and whatever splint or brace we employ the joints must be arranged with this in view. If rubber muscles are employed they must be attached in such way that the end of the heel will be made to approximate the calf. If webbing is employed in the shape of a strap, this must pass from a band about the calf to the heel, posteriorly. If a joint is simply used, there must be a reverse catch or a buckle of steel which will prevent the apparatus from dorso-flexion. Shoes constructed for this deformity must have an unyielding tongue, a high heel and a snug support about the ankle. It matters little what kind of joint or catch one employ at the ankle, the principle involved is the same. For nearly twenty years I have employed a brace that is constructed about as follows: A steel foot-plate, steel and leather heel-cup, uprights of steel on either side of the leg extending from the heel-cup to a semicircular band which passes around the calf, the steel uprights making a joint at the ankle with reversed catch. Inasmuch as most of the force is expended on the tibia anteriorly, the steel band is sometimes reversed and the leather portion of the band passes about the calf, while the steel portion is in front. In my earlier experience it seemed to me that this was all that could be desired. The patient seemed to walk better, and the immediate results were good. A long residence in hospital, however, impressed upon me the instability of such an apparatus, the frequency of repairs, the difficulty of impressing upon patients the necessity of keeping the foot always depressed. It was not an uncommon experience to have the joint completely changed by some local blacksmith, and sometimes months would elapse with the brace contributing to the increase of the deformity. In private practice I am able to control patients more easily, and in many instances have been able to hold the foot in very fair position: yet in no instance have I seen shortening of the tendon occur under treatment of this kind, and only in rare instances have I been able to foresee a time when apparatus could be dispensed with. My own conclusion, therefore, is that mechanical treatment does nothing more than give relief while the brace is in good repair.

For a number of years I allowed myself to be called a neurologist. Nervous diseases possessed a fascination for me. Men whose statements were entitled to respect taught that galvanism and faradism and massage would often effect a cure in a muscle palsied from polio-myelitis. As our knowledge of electricity increased such statements were regarded as unreliable. My own experience in electrical treatment of calcaneus corresponds, I presume, with that of the majority of neurologists of the present day. The current could not restore the motor power to the ganglion cells in the column of the cord. Mere mechanical irritation of the muscle once supplied by this power has little effect on the muscle itself. Applications of this kind improve the color of the skin; the circulation, as the enthusiastic practitioner says, is greatly improved; yet improved circulation does not bring power to a palsied muscle. When I have sent a case of this kind to a neurologist, I have received very little encouragement in the way of prognosis. We must all learn that the prognosis in ordinary infantile paralysis depends, as a rule, upon the extent of the cord lesion.

With such an outlook, therefore, I fell quite readily into operative procedures.

Mr. Alfred Willett published in the St. Bartholomew Hospital Reports for 1880, volume 16, "Remarks upon Resection of the Tendo-Achillis in Paralytic Talipes Calcaneus, with an Account of a New Method of Performing this Operation." He reported three cases, one operated upon October 9, 1879, and reported upon in July, 1880; another on December 13, 1879, not traced; another still, on April 19, 1880, last observation June 11, 1880. The immediate results were good. In a letter received from Mr. Willett under date of May 12, 1884, he stated that one of the cases operated upon was in a private patient, and had been under observation up to the date of his letter. The result was very satisfactory. The calcaneus was cured, and with the foot in normal position, the general improvement of the paralyzed limb was enhanced. He still wore a support, and was gaining in walking power without interruption. Mr. Willett was unable to give a final report in the other cases. In the summer of 1887 in a conversation with this surgeon, I got the impression that he was still enthusiastic over

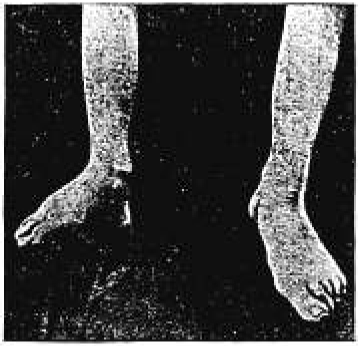

FIG. I.—SHOWING DEFORMITY IN CASE I.

the operation. He makes a Y-shaped incision with the stem of the Y toward the os calcis. The incision is continued down to the tendon, the V-shaped portion including the subcutaneous fat, while the portion of tendon exposed is in the stem of the Y. He resects one-half of an inch of this tendon thus exposed, brings the point of the V-flap with underlying tendon down to the distal portion, and this is approximated to the upper portion by sharp extension of the foot. He sutures the ends together and includes in the suture the V-shaped flap. He employs wire for this purpose. The wound is dressed antiseptically, and healing is prompt and uninterrupted.

CASE I. – Female, æt. 24 years, under mechanical and electrical treatment since 1872; operation May 14, 1884 Her deformity is shown by accompanying photograph. She complained much of fatigue on walking, and had experienced much trouble in wearing her apparatus. The tendon was exsected, the edges bevelled; wire sutures were employed; antiseptic dressing and plaster of Paris bandage over foot extended to the greatest possible limit. At the end of four weeks cicatrization had taken place, and she was not allowed to walk until two weeks later. At that time the tendon acted well, she walked with more ease, the heel was not elongated; the ankle itself was much stronger. She has not worn any apparatus since the operation, and my last observation was made January 9, 1890, nearly six years having elapsed. The heel still presents a clubbed appearance. The natural position assumed is shown in tracing No. 1. The tracing No. 2 shows the limit to which the foot can be flexed. No. 3 shows her voluntary flexion. She has slight power of extension; she is able to walk without any support. She does suffer from a deformity of the great toe, namely, sharp flexion. This she thinks has developed since the operation

CASE II.—Male, æt. 12 years. The left foot was in marked calcaneus. He had been under my observation for 10 years, had worn braces all this while. and the deformity of the foot had increased. The tendon was so long that, at the time of the operation, November 1, 1884, I removed three-quarters of an inch. On attempting to approximate the edges, I found that about one-quarter of an inch too much had been removed. I attempted to suture a piece of the tendon removed, and employed wire as in the former case. The foot was kept extended in plaster for two months, at the end of which time the wound was healed after a portion of the tendon had sloughed. This was removed. The immediate result was very good. The ultimate result however, was disappointing. He remained under observation for 6 or 8 months, during which time I had to employ apparatus because of paralysis of the quadriceps femoris. The mother became discouraged, and was unwilling to meet the expense of the apparatus.

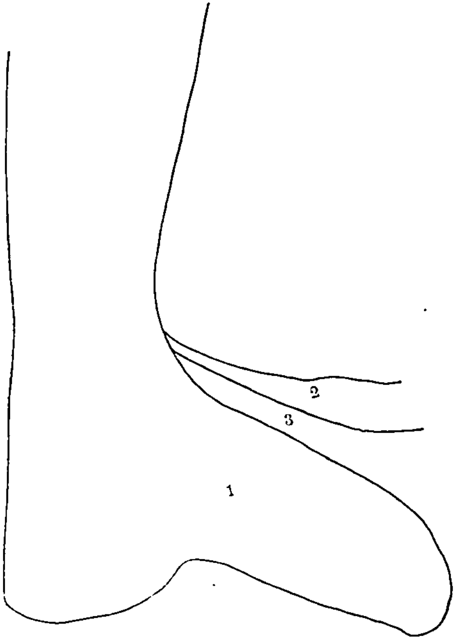

FIG. 2.—SHOWING RESULT OF TREATMENT IN CASE I.

The deformity has recurred, and is as intractable as ever. Not only this, the knee and thigh have become flexed by muscular shortening, and the boy walks on a crutch with limb dangling.

CASE III.—Male, æt. 11 years; operation July 19, 1886. The paralysis affected not only the posterior leg group, right side, but the anterior femoral group, right side, with the latissimus dorsi on right side.

I departed from the rule in this case, simply overlapped the ends after division, and employed cat-gut. The wound was closed by silk, over alternating sutures passing through the tendon. Dressing the same as before. The wound healed primarily; plaster not removed until two months had elapsed. Then a brace with reversed catch was applied. He wore the apparatus for six months. Since then he has worn a leather shoe with cork wedge in the heel and stiff leather tongue. The shoe has been kept in very poor repair, and only recently have we succeeded in getting him properly fitted. The last examination was October 18, 1889. The boy is able to flex and extend the foot well, tendon is not too long, but the anterior tibial muscle is inclined to shorten a little.

CASE IV.--Male, æt. 6 years. Calcaneus, left foot; equinovarus, right foot; both of paralytic origin. Operation, November 5, 1887. One-fourth of an inch of the tendon removed, ends well overlapped, plaster of Paris bandage dressing, and extending above knee, which is put up flexed. Wound healed without suppuration. The final result, January 13; 1890, is that he stands with the foot squarely on the floor, walks very easily, and, while the cicatrix is not very strong, the yielding has been comparatively little.

CASE V.-- Male, æt. 10 years. For many years an out-patient, wearing braces, getting electricity and massage. Presented at the time of operation, in February, 1888, flail like joint with heal depressed, tendon elongated. The operation was done very carefully, but sloughing took place at the end of the fourth or fifth week, and a portion of the tendon sloughed. The wound healed in about six weeks. He has worn a shoe with heal raised and tongue reinforced by steel. The last note was made on January 11, 1890. Knee hangs at about 120° with the heel and leg; cicatrix quite dense; can flex and extend; no varus or valgus; gets about without difficulty; wears a brace at night to keep the foot fully extended.

CASE VI.—Male, æt. 5½ years. Four years palsied; unable to walk. Operation February 10, 1888; primary union. At the time of his discharge from the hospital walked with great ease. Twenty-three months later reported by letter as in good condition; details not given.

CASE VII.—Male, æt. 12 years. Lame since the first year of his life. Walked on his heel, the ball of the foot occasionally touching. Operation February 15, 1888. Wound healed by primary union under usual dressing. Last observation made twenty-three months after date of operation. Wearing a pair of ordinary leather shoes; walks well, steadily gaining in power; stands squarely on sole of foot; does not tire on a reasonable amount of exercise; patient says his foot gives him no uneasiness; parents delighted with the result; tendon stretched a little allowing passive flexion to 75°; foot hangs at an angle of about 95°; can extend voluntarily only to about 120°.

CASE VIII.—Female, æt. 14½ years. Lame for nine years Many muscles of the limb affected besides the posterior tibial group Operation February 14, 1888; primary union. Last observation made twenty-three months afterwards. Walked without brace or support, and fairly well; tendon has stretched some, but cicatrix is strong.

CASE IX —Female, æt. 13 years. Lame from infancy. Required a support for the knee to walk, and then heel only touched the floor. Operation February 27, 1888, primary union. The case was really very little improved by the operation, as she still required apparatus on account of the paralysis of the quadriceps. Twenty-three months after the operation, the foot can be passively flexed to 80°, and passively extended to 125°. She can flex voluntarily to 120°. The result may be said to have been fair.

CASE X.—Male, æt 7½ years. Six years paralyzed. Walked on the heel and very lame. Operation March 17, 1888. Wound healed by granulation Twenty months later last observation was made. Tendon stretched a little, permitting flexion to 90°. The muscles on the anterior part of the foot. however, were short, and there was considerable valgus. Has paid very little attention to the shoe or apparatus since his discharge from the hospital.

CASE XI.—Male, æt. 13 years Lame since he was 2 years old; marked paralytic gait; heel and ball, however, both touching the floor. Operation March 24, 1888; primary union. Last observation 22 months afterward. Walked then very well; tendon a little long, but cicatrix strong.

CASE XII —Female, æt. 12 years. Infantile paralysis of many years' standing, though only two years markedly lame. Operation April 14, 1888; primary union; gait much improved. Twenty months later, very slight limp; can voluntarily flex and extend foot; cavus not marked. Little or no attention has been paid to the subsequent treatment.

CASE XIII.—Female, æt. 7 years. Paralysis came on when 2 years of age; tendon very long and heel prominent. Operation April, 1888; primary union; patient removed before foot was sufficiently strong for use. Foot in good condition and plaster applied just before patient was discharged, but it broke before reaching home, and the mother failed to appreciate the importance of keeping the foot extended.

Twenty-one months later patient found walking with an almost imperceptible limp, with foot squarely upon the floor; tendon had stretched considerably; moderate degree of calcaneo-valgus remains. Can voluntarily flex foot to 60°; it can be passively flexed to 55°, extended to 110°. It is necessary to protect the ankle by means of a spring in the shoe.

CASE XIV.—Male, æt. 11 years Paralysis of ten years' standing. Walked fairly well, but mostly on the heel, and with considerable valgus. Operation May 23, 1888; primary union; deformity was corrected and walked well. Twenty months later cicatrix was found to be strong; foot in very good shape; slight cavus remaining.

CASE XV.—Female, æt. 19 years; In the Out-Patient Department, wearing apparatus and getting electricity off and on for sixteen years; much disabled; heel only touching as she walked. Operation May 28, 1888; healed by extensive granulations. For a long while after the healing walked with foot in very good position, provided the shoe was properly constructed. Twenty months later found to have neglected her shoes; marked cavus remained; cicatrix strong; can voluntarily flex and extend; foot can be passively flexed to 90° and extended to 140°: complains a good deal of weakness of the foot, and result upon the whole not very satisfactory.

CASE XVI.—Male, æt. 6 years. Walked on heel. Operation June, 1888, in Out-Patient Department. Plaster removed six weeks later; foot in good condition; healed by granulation. Case not traced.

CASE XVII.—Male, æt. 14 years. Was in the Out-Patient Department for ten years wearing apparatus, which was much of the time out of repair and consequently ineffectual; walking then on his heel, and rolling toward the inner border of the foot. Operation July, 1888; primary union. Discharged from the hospital in good condition; foot in equinus. See Figure 3, which shows photograph of the foot after first dressing. This shows the position of the foot and knee in the plaster. Found 18 months later having sought other treatment and wearing a spring with free joint, but a support to the inner side of his foot. The foot could be flexed to 85° and extended to 140°. He was able to extend the foot voluntarily but not also to flex. He walked fairly well without apparatus, and it was quite evident that with a properly fitting shoe a useful limb would result.

CASE XVIII.—Male, æt. 7½ years. Paralyzed when 2 years of age; a characteristic limp, a long tendon. Operation July 24, 1888; primary union throughout. In September of same year discharged with foot in very good position; voluntary motion and passive flexion not beyond 95°. This boy went out into the country, neglected his shoes, got an instrument-maker to apply a long spring, and was found 18 months later, the tendon having stretched greatly, foot in marked valgus and the good results practically lost.

CASE XIX.—Male, æt. 9 years. In Out-Door Department for six or seven years wearing apparatus and getting electricity without good result. There was considerable loss of power in the thigh group of muscles as well. Operation July 24, 1888; primary union. Two months later discharged with foot in equinus. Seen 18 months afterward wearing a common leather shoe; able to flex the foot to about 80° and extend to 100°; walks very well; result good.

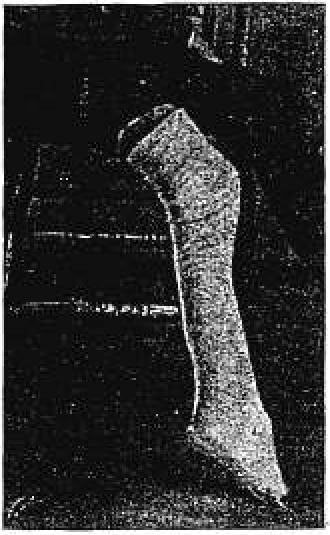

FIG. 3.—SHOWING POSITION OF FOOT, CASE 17, IN THE PRIMARY DRESSING.

CASE XX.—Male, æt. 8 years. Deformity at the hip and knee from shortening of tendons, and foot in marked calcaneus; unable to walk. First operation on thigh flexors consisting in free division by open wound and stretching of ham string tendons at the same time. Three or four months later, on October 2, 1888, Willett's operation. Fifteen months later walking fairly well with long spring; foot in good position; and result very satisfactory.

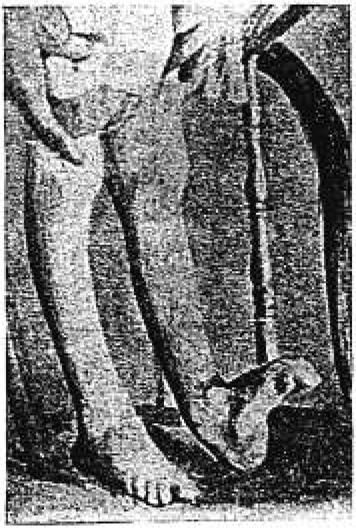

FIG. 4.—SHOWING CONDITION OF CASE 23 BEFORE OPERATION.

CASE XXI.—Female, æt. 10 years. An idiot and paralyzed since she was a year old. Operation November 2, 1888; healed by granulation. Tendon stretched a good deal during the following year, but with a brace and a shoe foot held in good position and tissues shortened a little. Result in this case fair.

CASE XXII.—Female, æt. 19 years. Paralyzed 17 years; walked on heel and inner border of foot. Operation November 13, 1888; healed by granulation. Twelve months later cicatrix strong; good action of foot; equinus position; foot can not be flexed beyond 90°. Result in this case excellent.

CASE XXIII.—Female, æt. 7 years. Paralyzed during the second year of her life; unable to walk; tendon very long. Operation November 16, 1888; healed by granulation. Both feet were operated upon at the same time, as this was a case of double calcaneus. (See photograph, Figure 4.) Fourteen months later walks with very slight limp; foot hangs at an angle of 125°; can be passively flexed to 75°, and voluntarily flexed to 80°; action of tendon good. Result very satisfactory.

CASE XXIV.—Male, æt. 4 years; with extreme calcaneus, paralytic. Operated upon January 29, 1889 in the Out-Patient Department and sent the same day to his home in Jersey City. Wound seemed to do well for about a week. Then suppuration set in, extensive sloughing followed and the child suffered from septic fever, with two or three abscesses near the knee from burrowing of pus upwards. The position of the foot was maintained however, and an excellent result was obtained. Eight months after the healing of the wound the boy walked very well with foot in equino-varus, the position being about 125°. He could not flex beyond 90°, and could extend to 140°. Although little attention has been given to the shoes, his mother was greatly pleased with the result.

CASE XXV.—Female, æt. 9 years. Lame from infancy; the whole posterior tibial group palsied and stretched. Operated on June 6, 1889 at her home on the banks of the Hudson. One side healed by granulation and one by primary union. The result in this case has not been satisfactory, inasmuch as I expected the shoe to afford all support that was necessary. The valgus persisted, the tendon stretched a little, and it has been necessary to make a brace without joint. The cicatrix on right side is strong; tendon acts well; foot hangs at an angle of about 120°; passive flexion can not be made beyond 90°; she can not flex the foot actively beyond 105°. She walks, however, very well in the rather clumsy shoe. Her last observation was made January 14, 1890.

CASE XXVI —Male, æt. 11 years. Operation September 13, 1889 Tracing of foot unfortunately not taken, but the deformity was one of high degree and cavus complicated. The wound healed by granulation. This patient was referred to me by my friend, Dr. Ansel G. Cook of Hartford, at which place, and with whose assistance, the operation was performed. Dr. Cook's report, January 13, 1890, is that the boy walks fairly well with his shoe. He can flex and extend it after a fashion. Examined February 17, and foot found in very good position. Action of tendon good; cavus not so pronounced; cicatrix has stretched a little.

CASE XXVII.—Male, æt. 8 years. Deformity extreme. Operation October 15, 1889; primary union. Last observation three months afterwards. Results still very good. Figure 5 shows position of foot flexed with moderate force before the operation, compared with the position of foot after the operation.

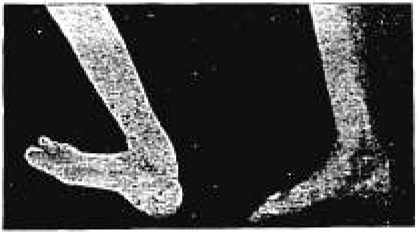

FIG. 5.—SHOWING POSITION OF FOOT IN CASE 27 BEFORE AND AFTER OPERATION

CASE XXVIII.—Female, æt. 12 years. Paralyzed from infancy. Hip and thigh group affected quite as much as the posterior leg group. She had been in hospital for several years wearing long springs. During the year 1889 she seemed to gain more power, and I was able in the summer to omit the brace from the right foot. On November 8, 1889, I did Willett's operation on the left foot, and got primary union. Three months later the foot could be flexed to 95° passively. She was not able to flex by reason of paralysis of the anterior tibial group, but could extend easily. It is necessary for her to wear a spring extending from the upper part of the thigh down to the foot, on account of paralysis of the quadriceps femoris. Result altogether very satisfactory.

CASE XXIX.—Female, æt. 4 years. Was referred to my clinic for an equino-varus of left foot, paralytic. This was so slight that it was not considered of any importance, but the tendo Achillis on the right side was very long, and the foot was in marked calcaneus. The operation was done in the presence of the class in November, 1889. The child was taken home the same day, and an opening not made in the plaster over the wound until a week had elapsed. It was made then on account of a little pain, and a portion of the tendon was found to have sloughed. The wound soon healed, however, and she now walks with a shoe, foot in equinus. Result is very good.

I want to express my great indebtedness to Mr. Fitzhugh of the Hospital for invaluable assistance rendered me in tracing out these cases, and for the statistical table from which I get the following resume.

The resume is as follows: There were 16 males, 12 females, making a total of 28 patients that have been traced. Of this number, 17 had a good result, 8 a fair result and 3 a poor result. By "good" is understood ability to walk with foot squarely upon the floor, not striking the heel first, and to walk without the aid of apparatus. By "fair" is understood ability to walk, but tendon has stretched a little and an anterior support is required to keep foot in good position.

Sixteen healed by primary union, and 12 by granulation. Of the 16 healing by primary union, there were 11 good results, 3 fair and 2 poor. Of the 12 healing by granulation, there were 6 good results, 5 fair and 1 poor.

Of the cases reported, the last observation was made in 1, six years after the operation; in 1, five years; in 1, from three to four years; in 1, from two to three years; in 15, from one to two years, and in 9, from three to twelve months.

Judging, then, from these results, it seems to me we can safely predicate a good result in a large number of cases operated upon. If the operation is done where any kind of home cooperation can be anticipated, it seems reasonable to expect a good result in every instance.